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(56) Documents Cited

GB 2260291 A GB 1301722 A WO 91/03361 A1

US 4557246 A US 4268965 A US 4004569 A

US 3945151 A US 3831577 A US 3590800 A

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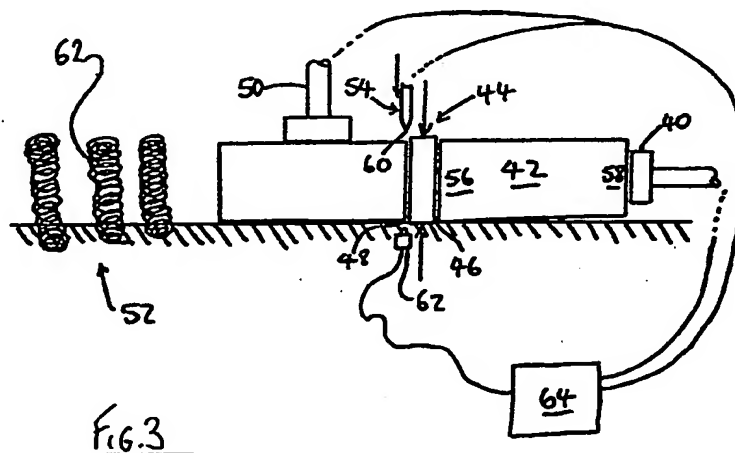
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(54) Brick cleaner

(57) A brick stripper for removing mortar from a used brick so that the brick can be re-used has a scraping surface, usually a die (2) and motive means (22) adapted to push a brick past the scraping surface so as to cause mortar or the like attached to the brick to be scraped off. The die (2) may have an adjustable aperture. A knife (54) may be provided to clean the ends of a brick, the die (2) cleaning the sides of the brick. A sensor (62) may be provided to ensure that the knife (54) operates when the brick (42) is in a correct position relative to the knife. Additional cleaning means (62) may also be provided to remove any discoloration of the brick that may be caused by pushing it through the die. Three examples of brick cleaning machines are described.



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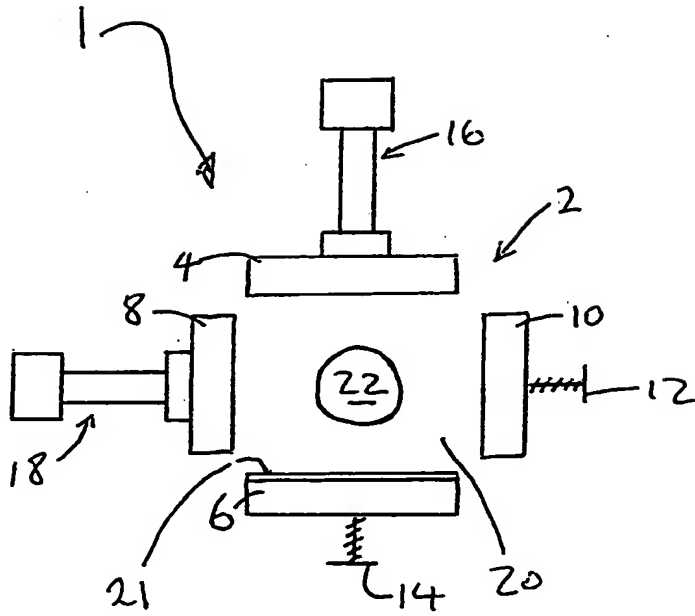


FIG. 1

Fig. 2

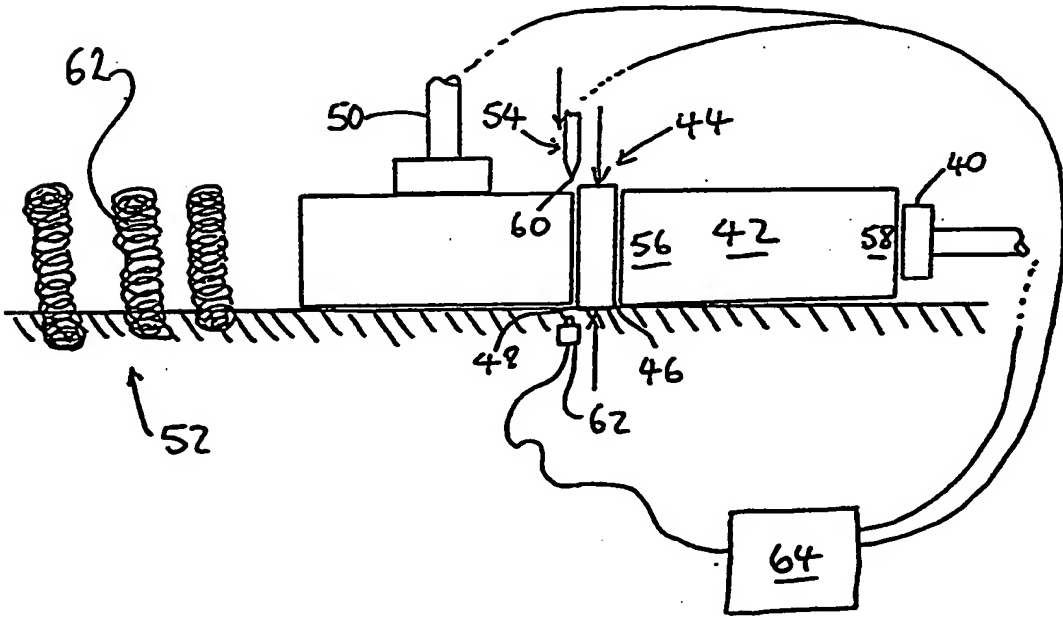
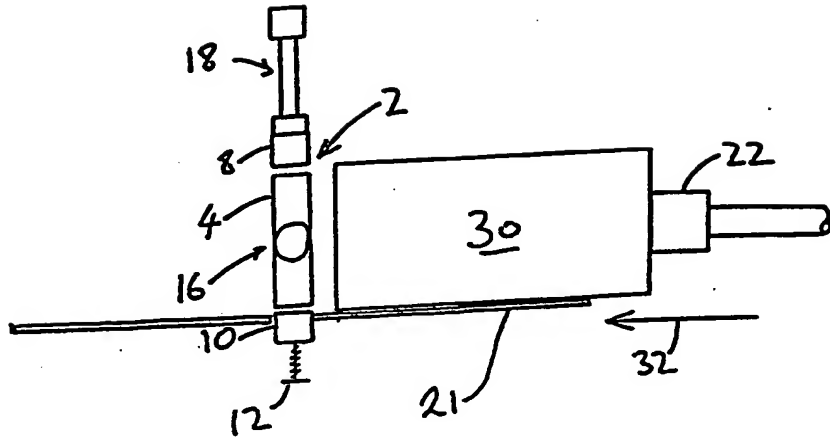


FIG. 3



Fig. 4

BRICK CLEANER

The present invention relates to a device and a method of cleaning bricks. It is particularly but not exclusively related to a device and a method of cleaning adherent materials including mortar from old bricks.

Bricks are used in very large quantities in the building industry. Although they are not expensive as a single unit item, the quantity of bricks required to build even a modest building can be very large.

Bricks are hardwearing. When a building or other edifice has been demolished a large number of bricks are left as remnants. Many of these bricks are still integral either as discrete units or as part of composite fragments, such as a part of a wall.

Rather than discarding the bricks many are collected to be re-used. Indeed, some people prefer the appearance of old bricks, especially when a new building has to fit in with an old building nearby. The collected old bricks often have mortar or cement adhering to their faces. A standard house brick has six faces: a relatively small face at each end and four larger faces along the longitudinal extent of the brick. In order for the bricks to be re-used the mortar has to be removed from the faces. This cleaning process may be performed by a workman chiselling away mortar from the faces of a brick with a hammer and a chisel. Such a procedure is time consuming. It may also result in a workman spending valuable time cleaning bricks. If a brick is too heavily coated with mortar it may not be cost-effective to clean the brick and it may be discarded.

It is an aim of the present invention to alleviate some of the problems discussed above.

According to a first aspect of the invention we provide a device for cleaning bricks comprising a scraping surface and motive means, the motive means being adapted to cause, in use, relative movement between a brick and the scraping surface so as to cause mortar or the like attached to the brick to be scraped off the brick by the scraping surface.

Preferably the motive means moves the brick relative to the scraping surface.

Preferably there is a first scraping surface, and a second scraping surface, and the motive means is adapted to cause simultaneous relative movement between the brick and both of the first and second scraping surfaces.

The first and second scraping surfaces are preferably substantially perpendicular.

Preferably there is more than one scraping surface that is moveable relative to a brick. Preferably scraping surfaces are moveable relative to two or more larger faces. Most preferably four scraping surfaces are provided, each being moveable relatively to its own one of the four larger faces of the brick. In an alternative arrangement the scraping surfaces may be fixed immovably relative to each other.

The scraping surfaces may be separate or they may be an integral whole. The scraping surfaces may be the faces of a die opening in a one piece die. The scraping surfaces may be blades, jaws, or blocks, or

they may be the inner faces of a die. The die may have a rectangular die opening into which an end of the brick may be inserted. Alternatively the jaws or blocks may be arranged to form such an opening.

Preferably the scraping surfaces are stationary and the brick is forced past them. The brick may be forced past the surfaces by mechanical means, for example a hydraulic ram. Alternatively a power source may be suitably geared to provide enough force to move the brick. Such suitable gearing may be provided by a screw thread. The power source may be an electric motor or an engine, or even by manual operation of a drive mechanism. The mechanical means may not act directly on the brick being processed. There may be a row of bricks arranged end to end with the mechanical means operating on one free end of the row.

The scraping surfaces may be jaws of hardened material, for example steel.

Preferably the jaws are arranged in a box-type configuration having open opposing ends. The hardened, scraping parts of the jaws may be facing inwardly.

In one embodiment we may have one or more of the jaws fixed relatively to a reference point. The fixed jaws may be adjacent.

Preferably one or more of the jaws are moveable relative to a reference point. Most preferably the one or more of the jaws are moveable by hydraulic rams.

A feed may be provided at the entrance to the box-type configuration of jaws to ensure that a brick

locates properly in the jaws. The feed may be a funnel or other guide means.

The device may have support means for supporting a brick prior to entering, and/or after leaving, the site of the scraping means. The support means may comprise a bed.

End working means may be provided to remove mortar from the relatively small end faces of the bricks. Preferably the end working means is adapted to scrape the end of a brick after it has passed the scraping surfaces. The brick may have wholly or partially passed the scraping surfaces before the end working means may act. Instead of scraping or cutting mortar from the ends of a brick the end working means may move with a component of movement in the longitudinal direction of the brick and deliver a blow to the end of the brick.

Preferably the end working means comprises a blade. The end working means may be driven across the end of a brick by motive force from a hydraulic ram or other power source. Alternatively the end working means may take the form of a device adapted to impact the mortar in a direction which passes through the plane of the end of the brick.

The end working means may act on one or both ends of a brick. Two end working means may be provided, one to act on each brick end.

Preferably sensor means is provided to detect a suitable position of the brick in order for the end working means to operate. The sensor means may locate a brick to mortar boundary, or may simply identify when

a brick has reached a desired position. The sensor means may be mechanical, optical, sonic or some other suitable variant.

Preferably clamping means is provided to hold a brick whilst the end working means operates. The clamping means may be a hydraulic ram or an end stop. The end working means may act on one end of a brick, whilst the other end bears against an end stop.

The end working means may operate on the front end of a brick without the brick being clamped by the clamping means.

Preferably cleaning means is provided. The cleaning means may act on the brick following an operation by the scraping means.

The cleaning means may comprise brushes. The brushes may comprise wire brushes. Alternatively or additionally other cleaning means may be provided such as wire, ultrasound, water, water jets or other suitable variant.

In another variant a series of dies may be provided having progressively smaller die apertures. This may obviate the need to provide cleaning means.

According to a second aspect of the invention we provide a method of cleaning bricks comprising the step of simultaneously moving more than one scraping surface relative to more than one face of the brick.

Preferably the method also comprises one or more additional steps.

The method may involve moving the first and second scraping surfaces relative to the larger faces of a brick. The scraping surfaces may move relative to all of the larger faces of a brick.

Preferably there is a scraping surface for each of the larger faces of a brick.

Preferably the brick is moved past the scraping surfaces which are kept stationary.

Preferably material is removed from one or both ends of the brick by end working means.

It will be appreciated that where we refer to "brick" we intend this to cover other similar articles which have a substantially constant cross-section and which require cleaning. For example breeze-blocks, or kerb stones, or pavior blocks, or cobble stones, or even paving slabs (these could have their side edges cleaned in a similar way). "Brick" is to be interpreted widely, and includes all building or construction elements used in construction.

An embodiment of the invention, given by way of example only, is described below with reference to the accompanying drawings of which:-

Figure 1 shows an end view of a brick cleaning machine showing an arrangement of four jaws;

Figure 2 shows an overhead view of a brick being pushed into a die;

Figure 3 shows a schematic side view of another machine for cleaning bricks; and

Figure 4 shows schematically a further machine for cleaning bricks.

Figure 1 shows a schematic arrangement of a brick cleaning machine having a die 2. The die comprises of four jaws: an upper jaw 4, a lower jaw 6 and side jaws 8 and 10. Jaws 6 and 10 may be adjusted in position by means of screw mechanisms 12 and 14. Once adjusted into a correct position, the screw arrangements are locked via locking means (not shown) and the jaws 6 and 10 are effectively fixed in place.

Jaws 4, and 8 are moveable by means of respective hydraulic rams 16 and 18. The jaws 4 and 8 are moved into a correct position such that a die aperture 20 between the inner faces of the jaws is only slightly larger than a brick to be passed through the die 2.

A bed 21 is associated with jaw 6 and supports a brick prior to operation of the device.

The motive force to push a brick through the die 2 is provided by a hydraulic ram 22, which is seen end on in Figure 1.

Figure 2 shows another schematic view of the machine 1, this time from overhead showing a brick 30 about to be pushed through the die. It must be understood that the brick is schematic and in reality would be covered by mortar or other material to be removed from the brick. The ram 22 which in use operates so as to push the brick 30 in the direction of the arrow 32 into the die 2 may be seen more clearly in this picture.

The brick is, in use, pushed through the die 2 which strips off old mortar clinging to the used brick. The scraping surfaces of the die 2 strips off mortar on the four elongate oblong sides of the brick. We have surprisingly found that the action of pushing the brick through the die also causes some, and in some instances, substantially all, of the mortar to fall away from the front and rear end surface of the brick. With hindsight we suspect that this is because force transmitted by the die parallel to the longitudinal axis of the brick may be translated into a component of force perpendicular to this axis, perhaps by contact between end mortar and side mortar. This is, however, just our theory of why it might work.

It will be appreciated that the ram 22 could be replaced by any motive source: an electrical drive, or even a manual device (preferably with appropriate gearing) to increase mechanical advantage. We may find it desirable to have a sudden impact, or shock, applied to the brick. This may be part of the way in which the bricks is driven through the die.

Figure 3 shows a schematic view of another brick cleaning system. A ram 40 pushes a brick 42 into an entry end 46 of a die arrangement 44. The die arrangement 44 has been adjusted earlier as discussed in relation to Figure 1, to provide a die aperture slightly larger than the cross-section of a brick to allow the brick to pass through the die but to cause any material adherent on the brick to impinge on one or more of the jaws of the die and be scraped off.

Once a leading end 56 of the brick has emerged from the die, and whilst a portion of the brick is held in the die a blade, cutter or other scraper 54 is

brought down against material adhering to the lead end 56. A probe or sensor 62 is adapted to detect the position of the brick relative to the blade 54. The sensor 62 provides a signal to a processor 64 which triggers operation of the blade 54. The processor also controls the rams 40 and 50. The cutting edge 60 of the blade is brought into contact with the brick/mortar boundary with sufficient force to break the mortar away from the brick. The edge 60 may alternatively be brought down on the body of the mortar to break it away. Rather than a blade, the scraper 54 may be a block adapted to be brought down on the mortar.

A blade or scraper 54 may be omitted altogether. The scraping action on the larger side faces of a brick may also loosen the mortar on the end of a brick and end cleaning may also occur in this way.

Once a brick has passed through the die and emerged at an exit end 48, it is clamped with a clamping hydraulic ram 50 or some other suitable clamping means. A mortar-stripping operation is then performed by the blade 54 on a following edge 58. Again the sensor 62 identifies the position of the brick, and hence controls the operation of the blade 54. Alternatively, a different sensor may be provided for this.

The brick may still have remnants of material adhering to its outer surface, or marks caused by the scraping procedure. The clamping is removed and the brick is then pushed to a cleaning station 52. The cleaning station has a set of wire brushes 62 or other suitable cleaning means.

Cleaning may occur by virtue of frictional contact between the cleaning means and the outer surfaces of the brick or may be an active process as would be the case if high pressure water jets were to be used. Vibrations, such as ultrasound, may be used to clean the brick.

Cleaned bricks may be collected by mechanical means or taken by conveyor to a suitable collection point.

The progress of bricks through the system is sequential. Once a brick has been pushed through the die 44 by the ram 40, another, uncleaned, brick may be placed in the location between ram 40 and the die 44 previously occupied by an earlier brick. Uncleaned bricks may be supplied by a hopper type of arrangement.

The progress of bricks may be solely due to motive means pushing at an end of a row of bricks placed end to end for example a brick being pushed through the die may be being pushed by another brick. Alternatively the progress of bricks could be by means of a conveyor or other transport means, or the intermediate steps could be carried out manually.

More than one mortar-stripping member (e.g. blade similar to blade 54) may be provided movable transverse to the direction of movement of a brick. For example once a brick is known to be properly located knives may operate at each of its ends to clean both simultaneously. There may be positive location means adapted to locate a brick in a predetermined relationship relative to the machine.

The sensor 62 may be an optical (e.g. U.V. or I.R.) sensor, or a mechanical "feeler" or switch type sensor (e.g. one adapted to detect the presence of a wall of the brick, or its weight), or any other suitable sensor.

Instead of having adjustable jaws for the die we may have a fixed die. This may be a hole in a plate or wall. To accommodate bricks of different cross-sections we may have a die member that is moveable relative to the motive means (or brick support bed) so as to allow a second, different die, to be in an operative position. The die member may be replaceable with another die member. The other die member may have the same external size and shape so as to allow it to be fixed in place relative to the remainder of the machine, but a differently sized, or shaped, hole in it.

Another machine for removing mortar from a used brick is shown in Figure 4. In this embodiment the die 100 is movable relative to a frame 102. Guide means 104 guide the die 100 for linear reciprocating movement between two end stops 106 and 108. The die 100 has teeth 110 which assist in scraping off old mortar or dirt. Two bricks 112 and 114 are held in the frame 102. The die 100 is in use slid on guide runners, comprising the guide means 104, to the left as shown in Figure 4 to remove mortar from brick 112. The brick 114 has had this scraping or stripping operation performed on it already and is removed from the operative region of the machine and replaced with another old brick, with its attached mortar. The die 100 is then urged to the right, cleaning the newly introduced brick and freeing the newly cleaned brick 112 for removal and replacement with another, uncleaned, brick. This

double-acting reciprocating movement is repeated again and again, with new bricks being introduced at each half cycle.

The bricks may need to be supported on support means which allow the teeth of the die to contact the brick around all four sides simultaneously.

In another modification of either embodiment the brick may be moved angularly relative to a stripping member (or vice-versa) to strip an end face of the brick. The brick may have a rotating movement. The die may be made to move angularly so as to bring mortar on end face of a brick held in the die onto a stripping member.. Thus instead of relative linear movement between an end of a brick and a stripping member there may be relative angular movement.

The feature of the die having an uneven surface, or surface formations such as teeth, to assist in removal of the mortar is applicable to all embodiments of the invention.

We may provide a kit comprising a machine in accordance with a previous aspect of the invention and a plurality of die members adapted to be mounted in the machine in an operative condition.

CLAIMS

1. A device for cleaning bricks comprising a scraping surface and motive means, the motive means being adapted to cause, in use, relative movement between a brick and the scraping surface so as to cause mortar or the like attached to the brick to be scraped off the brick by the scraping surface.
2. A device according to claim 1 in which there is a first scraping surface, and a second scraping surface.
3. A device according to claim 2 in which the motive means is adapted to cause simultaneous relative movement between the brick and both of the first and second scraping surfaces.
4. A device according to claim 2 or claim 3 in which the first and second scraping surfaces are substantially perpendicular.
5. A device according to any preceding claim in which four scraping surfaces are provided.
6. A device according to any preceding claim in which the scraping surfaces are blades, jaws or blocks.
7. A device according to claim 6 in which the blades, jaws or blocks are arranged to form an opening into which an end of the brick may be inserted.
8. A device according to any preceding claim in which the or each scraping surfaces is stationary and the brick is moved relative thereto.

9. A device according to any preceding claim in which the motive means is a hydraulic ram.

10. A device according to any of claim 1 to 8 in which the motive means is a screw thread.

11. A device according to claim 10 in which the screw thread is adapted to be manually driven.

12. A device according to any preceding claim in which one or more of the scraping surfaces are moveable relative to a reference point.

13. A device according to claim 12 in which the one or more of the jaws are moveable by hydraulic rams.

14. A device according to any of claims 1 to 11 in which the scraping surfaces comprise faces of a die opening.

15. A device according to any preceding claim which comprises a feed at an entrance to the or each scraping surface to facilitate the proper location of a brick in the jaws.

16. A device according to any preceding claim which comprises end working means to remove mortar from the end faces of the bricks.

17. A device according to claim 16 in which the end working means is adapted to scrape the end of a brick after it has passed the scraping surfaces.

18. A device according to claim 16 or claim 17 in which the end working means is adapted to move with a component of movement in the longitudinal direction of

the brick and deliver a blow to mortar at the end of the brick.

19. A device according to any of claims 16 to 18 in which the end working means comprises a blade.

20. A device according to any of claims 16 to 19 in which the end working means may act on one or both ends of a brick.

21. A device according to any of claims 16 to 20 in which sensor means is provided to detect a suitable position of the brick in order for the end working means to operate.

22. A device according to any of claims 16 to 21 in which clamping means is provided to hold a brick whilst the end working means operates.

23. A device according to any preceding claim in which clamping means is provided.

24. A device according to any preceding claim in which cleaning means is adapted to act on the brick following an operation by the scraping means.

25. A device substantially as described herein with reference to: Figures 1, 2 and 3; or Figure 4; of the accompanying drawings.

26. A method of cleaning bricks comprising the step of simultaneously moving more than one scraping surface relative to more than one face of the brick.

27. A method substantially as described herein with reference to Figures 1 to 4 of the accompanying drawings.

Relevant Technical Fields

- (i) UK Cl (Ed.N) B5E (EPA)
(ii) Int Cl (Ed.6) B28D (1/00, 1/26, 1/28)

Search Examiner
P G BEDDOE

Date of completion of Search
18 MAY 1995

Databases (see below)

(i) UK Patent Office collections of GB, EP, WO and US patent specifications.

(ii) ONLINE: WPI

Documents considered relevant following a search in respect of Claims :-
1-27

Categories of documents

- X:** Document indicating lack of novelty or of inventive step. **P:** Document published on or after the declared priority date but before the filing date of the present application.
- Y:** Document indicating lack of inventive step if combined with one or more other documents of the same category. **E:** Patent document published on or after, but with priority date earlier than, the filing date of the present application.
- A:** Document indicating technological background and/or state of the art. **&:** Member of the same patent family; corresponding document.

Category	Identity of document and relevant passages		Relevant to claim(s)
X	GB 2260291 A	(PAGE) see especially Claim 1; page 5 line 29 - page 7 line 11; Figure 1	1, 26 at least
X	GB 1301722	(DRAY) see especially Claim 1; page 2 line 63 - page 3 line 31; Figure 1	1 at least
X	WO 91/03361 A1	(AMERICAN INDUSTRIAL) see especially page 10 lines 8-22; Figure 1	1, 26 at least
X	US 4557246	(SEELEY) see especially Figure 5; column 2 lines 44-46	1, 26 at least
X	US 4268965	(ASKEW) see especially Claim 1; column 4 lines 1-17	1 at least
X	US 4004569	(STEPHENS) see especially column 4 lines 3-23	1, 26 at least
X	US 3945151	(COOK) see especially column 1 lines 39-56; Figure 1	1, 26 at least
X	US 3831577	(PRICE) see especially Claim 1; column 2 lines 30-58	1 at least
X	US 3590800	(LEWIS) see especially Claim 1; column 2 line 48 - column 3 line 4; Figure 1	1 at least

Databases: The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).